Training

CAP MODEL ROCKETRY PROGRAM

This supplement establishes standards and procedures for rocketry within Arizona Wing as authorized by CAPR 50-20 and provides a standardized framework for member participation beyond the basic program established therein. This supplement augments the existing program but does not supercede any published materials from National Headquarters CAP. For issues not directly addressed in this supplement refer to CAPR 50-20.

1. Terms Explained. In keeping with the safe practices that all CAP cadets and senior member supervisors who are about to engage in model rocketry activities must observe, this supplement must explain these additional terms:

a. "Advanced Rocketry" is the term used to describe operations conducted beyond the limits set forth in the "Basic Rocketry" program described in CAPR 50-20

b. "Unsanctioned Launch" is the term used to describe any launch activity involving experimental motors or a launch activity not controlled and sanctioned by a CAP unit, NAR section or Tripoli prefecture.

c. "High Power Rocketry" (HPR) is the term used to describe all rockets launched with a total impulse greater than 160 Newton-seconds.

d. "Aeronaut" is the term used to describe a member that builds and flies a model or high power rocket.

2. Objectives. This supplement is designed to:

a. Establish stages in the Model Rocketry Program to insure that members:
   1) Begin with basic skills
   2) Progress steadily with increasingly more challenging skills
   3) Ensure safety by attempting only those activities which are safe within each member's knowledge/experience levels

b. Provide members additional opportunities to participate in aerospace related activities to develop knowledge of aerospace sciences, physics, mathematics, science and engineering principles and methodologies.

c. Provide activities and opportunities for the development of project/program leadership skills.

3. Safety. This supplement exists primarily to ensure the safety of CAP personnel during rocketry activities. Safety is the primary goal at all CAP events. All members are responsible to maintain adherence to safety procedures. Any member noticing a safety issue must immediately declare a "hold" until the safety issue has been resolved.

4. Program Development. This supplement assumes establishment of a basic rocketry program in the unit has been accomplished IAW CAPR 50-20. An advanced rocketry program should not be attempted until a compliant basic rocketry program is in place. All rocketry programs developed at the unit must meet the following requirements.

a. Rocketry programs should be developed using this supplement as a guide and should comply with all requirements and restrictions contained within. Training materials provided by Arizona Wing will supercede local unit materials where redundancy exists. However, individual units are encouraged to expand upon these training materials by drawing on material available from reputable sources such as

NAR, Tripoli or NASA. The Wing Model Rocketry Project Officer (WMRP), Director of Aerospace Education (DAE) or Commander (CC) must approve additional sources other than those listed. Wing Units should base their local rocketry-training program on the material contained in the "Arizona Wing Rocketry Program" CD that can be obtained from the Wing Office. Any developed program must comply with the progression contained within this supplement.

b. All participants must keep a journal or log (hereafter known as the MRP Journal) detailing construction activities, launches, range staff participation for all rocketry activities, notes, sketches and any participation in any trips or tours. This document will be the basis for progression under the Arizona Wing Model Rocketry Program (AZWMRP). Launch data sheets, official witness logs and copies of certificates should be included where applicable.

c. Only launches made at events officially sanctioned by CAP, NAR or Tripoli will be accepted as applying towards advancement under the AZWMRP.

d. Participants must comply with all NAR, Tripoli and governmental laws, regulations, restrictions, ordinances, codes, rules, etc.

e. Every launch made should include at least one prediction of a flight characteristic, which is then measured for that flight. Flight characteristics that can be measured include but are not limited to duration of flight, altitude of flight, distance between the launch and touchdown points, etc.

f. Units should conduct Visits/tours of facilities engaging in space exploration/space systems development.

BASIC MODEL ROCKETRY PROGRAM

Novice Aeronaut
Level I: Very Simple. This is the *beginner's* level.

1. Participants must be current members of CAP to participate in Level I
2. Participants must have completed:
    a. Achievement I for Cadets
    b. Level I Training and CPPT for Seniors
3. Level I participants may only fly single stage rockets until completion of the "Titan Stage" requirements.
4. Level I participants are restricted to class "C" impulse or less.
5. Level I participants are restricted to parachute or streamer recovery methods.
6. Payloads are not permitted until completion of "Titan Stage" requirements.
7. Level I participants must complete the Redstone, Titan and Saturn stages in succession.

Apprentice Aeronaut
Level II: Fairly Easy. This is for persons with *some* model rocket construction *experience.*

1. Level II participants must have completed Level 1 to participate in Level II
2. Level II participants are restricted to simple solid propellant single use motors
3. Level II participants are restricted to class "E" impulse or less
4. Level II participants are restricted to parachute or streamer recovery methods
5. Level II participants must **successfully design, build and fly** a model rocket using class "C" impulse motors or less
6. Before flight the rocket must be inspected for stability and safety by a qualified Range Safety Officer IAW CAPR 50-20

Note: Cadets must be 14 years old or older to use class "E, F and G" impulse motors.

ADVANCED MODEL ROCKETRY PROGRAMS

Aeronaut
Level III: Intermediate. This is for the experienced model rocket builder and flyer.

1. Level III participants must have completed Level II
2. Level III participants must have completed the performance and leadership requirements for the "Model Rocketry Badge" IAW CAPR 50-20
3. Level III participants are restricted to class "G" **total** impulse or less
4. Level III participants must successfully complete a flight using a parallel staged (cluster) rocket containing single use motors
5. Level III participants must successfully complete a flight using a single staged rocket containing a re-loadable motor
6. Level III participants must successfully complete a flight using the "glide" recovery method
7. Level III participants must complete or have completed flights using **both** the "parachute" and "streamer" recovery methods.
8. Level III participants must act as mentors/instructors for a minimum of six months in squadron model rocketry program in which three or more members achieve level II status or earn their model rocketry badges.
9. Level III participants must plan and conduct at least one tour of a facility engaging in space exploration/space systems development.

Note: Cadets must be 18 years old or older to receive Level 1 or Level 2 certification with NAR or Tripoli. Cadets must also be 18 years old or older, or be supervised by an adult to handle any reload-able motor.

Senior Aeronaut
Level IV: Challenging. This is for the *advanced* model rocket builder and flyer.

1. Level IV participants must have completed Level 3 requirements
2. Level IV participants are restricted to class "G" **total** impulse or less prior to NAR/Tripoli Level 1 certification flight.
3. Level IV participants are restricted to class "I" **total** impulse after NAR/Tripoli Level 1 High Power certification achieved.
4. Level IV participants must complete Level I certification under NAR or Tripoli
5. Level IV participants must act as a project officer for a squadron model rocketry program for a minimum of six months. A cadet may act as the project officer when supervised by a qualified senior member.

Master Aeronaut
Level 5: Extremely Challenging. This is recommended for the *expert* model rocket builder and flyer.

1. Level V participants must complete Level IV requirements
2. Level V participants are restricted to class "I" **total** impulse or less prior to NAR/Tripoli Level 2 High Power certification flight.
3. No restrictions under this supplement after NAR/Tripoli Level 1 certification achieved, however, Level V participants must continue to comply with all NAR and Tripoli and governmental laws, regulations, restrictions, codes, rules, etc.
4. Level V participants must complete Level 2 certification under NAR or Tripoli
5. Level V participants should continue to support CAP Model Rocketry program activities at the squadron, group and wing levels and provide assistance to other units who wish to develop their own rocketry programs.
6. Level V participants should lead/supervise exploration of rocketry programs and related activities such as:
    a. CAP participation in the ASU Mars Explorer Program
    b. Space camp and other NASA educational activities

c. Aerospace day and other outreach programs
d. NCASE and other educational forums
e. Providing news and information to cadets on any aerospace events.

These skill levels must be implemented in the order given above for safety reasons and for sound learning practices. Each unit's program should be designed with emphasis on scientific exploration. Launching rockets is intended to be a vehicle to support learning and science education rather than the objective. Participating cadets are encouraged to participate in the "NARTREK" and "NARTREK Cadet" Programs in conjunction with the Arizona Wing program, but they must meet the CAP objectives for each level to ascend to the next level.

5. Certification for Award of the Model Rocketry Badge. Upon completing all program requirements specified in CAPR 50-20 and the "CAP Model Rocketry Program" text, cadets approved by the unit commander shall be considered the authorized to wear the CAP Model Rocketry badge I.A.W. CAPM 39-1. A copy of this documentation and must be placed permanently in the cadet's personnel file.

6. Certification of rocketry achievement level. The MRP Journal shall be the basis for evaluation of a member's participation in the advanced rocketry program. Upon completing all program requirements specified for a given level in this supplement cadets shall submit their MRP Journals for evaluation to their unit commander or his designee. If the MRP journal documents the completion of the requirements for the level sought, the unit commander or his designee shall annotate the member's MRP journal with the following statement.

" __Name/Rank of member__ has successfully completed all of the requirements in the Arizona Wing Supplement to CAPR 50-20 for Level ___ of the Arizona Wing Model Rocketry Program.

Certified by __Name/Rank of member/Title__ __Unit Name__"

7. Recognition of Prior Experience. This supplement recognizes that CAP members may have had previous rocketry experience before they joined CAP. BSA, NAR and Tripoli participation **prior to** joining CAP are considered as equivalent training as established in the table shown in figure 1. Upon Joining CAP, new members are automatically considered for participation at these levels and are immediately subject to the restrictions of this supplement. All participants must provide documentation commensurate with the level of achievement claimed. In addition, members must complete both Level I Training and CPPT for seniors or Phase I for cadets prior to active participation in rocketry within Arizona Wing. Previous experience, however, cannot be applied towards the award of the CAP Model Rocketry Badge. This award may only be presented I.A.W. CAPR 50-20.

Figure 1 - Non CAP Program Equivalency Table

NAR or Tripoli achievement Completed	Equivalent Level for CAP
NARTREK Bronze Achievement Level	Level I
NARTREK Silver Achievement Level	Level II
NARTREK Cadet Apollo Level	Level II
Boy Scout Space Exploration Merit Badge	Level II
NARTREK Cadet Skylab Level	Level III
NARTREK Gold Achievement Level	Level III
NAR/Tripoli HPR Level 1 Certification	Level IV
NAR/Tripoli HPR Level 2 Certification	Level V

7. Range Operations

a. CAP Controlled Launches – During launches controlled by CAP personnel range operations must be conducted I.A.W. this supplement.

1) Range Control Officer (RCO) – The RCO must have completed Level III under this supplement and be a NAR senior member. The RCO may be a cadet provided a CAP senior member who is also qualified to be a RCO supervises the cadet acting as the RCO.

2) Range Safety Officer (RSO) – The RSO must have completed Level III under this supplement and be a NAR senior member. The RSO may be a cadet provided a CAP senior member who is also qualified to be a RSO supervises the cadet acting as the RSO.

3) If a launch will involve high power rockets ("H" total impulse or higher) then the RSO must be NAR or Tripoli level II certified.

4) Range Protocols – The Range operations procedures in AZWP 50-20 should be used during all CAP controlled launches.

b. NAR and Tripoli Controlled launches – During launches controlled by NAR sections or Tripoli prefectures CAP members may participate as range personnel provided they meet the requirements established by the organization supervising the launch. In this situation, CAP members must familiarize themselves with launch protocols used by the local NAR section or Tripoli prefecture and adhere to them.

c. Unsanctioned launches – CAP members are not permitted to participate in an unsanctioned launch as CAP members, nor does CAP authorize or endorse any participation in an unsanctioned launch. All participation occurring during an unsanctioned launch is ineligible for award of credit towards advancement in this program.

OFFICIAL

Signed
John Varljen., Colonel, CAP
Arizona Wing Commander

1 Attachments
1. CAP Model Rocket Launch Data Sheet

SUMMARY OF CHANGES
This Supplement contains no changes to existing regulation. This supplement augments existing regulation within the confines of Arizona Wing.

Attachment 1

CAP MODEL ROCKET LAUNCH DATA SHEET

NAME	GRADE	CAP SERIAL NUMBER

SQUADRON	CHARTER NUMBER	WING

PERSONNEL PARTICIPATING

RANGE CONTROL OFFICER	RANGE SAFETY OFFICER
LAUNCH CONTROL OFFICER	**OTHERS**

WEATHER DATA

TEMPERATURE	WIND DIR/VEL	PRESSURE ALT	VISIBILITY	CEILING

MODEL ROCKET DATA

MAKE AND MODEL	LENGTH (SHOW EACH STAGE)	DIAMETER (SHOW EACH TRANSITION)

NUMBER AND TYPE OF FINS	MOTOR MAKE/MODEL/DELAY	TOTAL WEIGHT

EXPECTED PERFORMANCE

TOTAL FLIGHT TIME	MAXIMUM ALTITUDE	AVERAGE VELOCITY

LAUNCHING DATA

LAUNCH SITE LOCATION	LAUNCH EQUIPMENT TYPE
LAUNCH ANGLE	**DATE AND TIME**

SUCCESSFUL IGNITION	☐ YES	☐ NO	(IF NO, EXPLAIN PROBLEM AND CORRECTIVE ACTION IN REMARKS.)
SUCCESSFUL LIFTOFF	☐ YES	☐ NO	(IF NO, EXPLAIN PROBLEM AND CORRECTIVE ACTION IN REMARKS.)
SUCCESFUL BOOST	☐ YES	☐ NO	(IF NO, EXPLAIN PROBLEM AND CORRECTIVE ACTION IN REMARKS.)
SUCCESSFUL EJECTION/RECOVERY	☐ YES	☐ NO	(IF NO, EXPLAIN PROBLEM AND CORRECTIVE ACTION IN REMARKS.)

TOTAL FLIGHT TIME	MAXIMUM ALTITUDE	ESTIMATED AVERAGE VELOCITY

IMPACT DISTANCE	FLIGHT BEHAVIOR	OTHER

REMARKS (USE REVERSE SIDE IF ADDITIONAL SPACE IS REQUIRED)